

Appl. No. : 10/601,037
Filed : June 19, 2003

REMARKS

Claims 15-42 are pending in the present application and stand rejected under 35 U.S.C. § 103(a) as obvious over Bai et al. (U.S. Patent No. 6,166,417) in view of Elers et al. (WO 01/29893) and Pomarede et al. (U.S. Patent No. 6,613,695). In rejecting independent Claim 15, the Examiner found that Bai discloses depositing a gate dielectric layer over first and second regions of a substrate and depositing a barrier layer directly over the gate dielectric layer. While Bai does not teach depositing a barrier layer by a particular method, the Examiner found that this deficiency is made up for by Elers, which discloses deposition of nanolaminate barrier layers by atomic layer deposition (ALD). The Examiner simply concludes that it would have been obvious to one of ordinary skill in the art to form the barrier layer of Bai by ALD because Elers teaches that ALD is a way to form a barrier layer with enhanced diffusion barrier properties. In addition, the Examiner recognized that neither Bai nor Elers teach or suggest depositing the gate dielectric layer by atomic layer deposition. The Examiner found that Pomarede makes up for this deficiency.

First, Applicant would like to point out that Pomarede and the present application were subject to common assignment at the time of the invention and are commonly owned. Pomarede is only available as prior art under 35 U.S.C. §102(e). As a result, Pomarede is not available for obviousness purposes under 35 U.S.C. § 103(c).

In addition, Applicant continues to maintain that the Examiner has not provided the required motivation for the combination of Bai and Elers. While Elers may teach the deposition of a barrier layer by ALD, such teaching by itself does not teach or suggest depositing a barrier layer by ALD in the context disclosed by Bai. The disclosure in Elers is directed to the formation of barrier layers in a completely different context from the disclosure in Bai. In particular, Elers teaches the formation of barrier layers in the context of dual damascene structures, not in the context of metal gates. As Applicant has previously pointed out, deposition of barrier layers in a dual damascene context requires a high conformality process. This is not the case for deposition of a barrier layer in the formation of a metal gate as disclosed by Bai. To the contrary, one of skill in the art would recognize that the ability of a process to deposit a barrier layer with high conformality is not relevant to the formation of the barrier layer disclosed in Bai. The skilled artisan would not be motivated to use the ALD process disclosed by Elers because of the high

Appl. No. : 10/601,037
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cost associated with the monolayer by monolayer deposition of the barrier layer by the process disclosed in Elers.

In response to Applicant's previous arguments, the Examiner simply points out that while Bai teaches no method of forming a barrier layer, Elers teaches one specific method for forming a barrier layer. However, the fact that Elers teaches a method for depositing a barrier layer without more, does not mean that one of skill in the art would select that method over other methods that are widely available in the art. *In re Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984). "The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification." For example, U.S. Patent No. 6,436,840 (courtesy copy attached) teaches the advantages of depositing a barrier layer by a CVD process in the context of the formation of a metal gate (column 5, lines 8-29). Similarly, U.S. Patent No. 6,373,111 (courtesy copy attached) discloses depositing a TiN layer by CVD between the metal gate and the dielectric. One of skill in the art would recognize that a CVD process or other process such as nitridation (see, e.g. U.S. Patent No. 6,225,168; courtesy copy attached), would be faster and significantly less expensive than the atomic layer deposition process taught by Elers for the formation of the barrier layer taught by Bai. As a result, one of skill in the art would select the faster CVD deposition process over the ALD process taught by Elers. The Examiner has provided no reason that one of skill in the art would select the ALD process disclosed by Elers for combination with the context of Bai.

With respect to the disadvantages of ALD, the Examiner states that they are obviously not enough to dissuade one of skill in the art from using ALD because "that is exactly what Applicants have done in their invention." The Examiner goes on to state that "Applicant's argument that one of ordinary skill in the art would not use ALD to deposit layers in a situation in which high conformality is not required is belied by their own use of ALD to deposit a layer in the same situation." (Emphasis added). Applicant respectfully submits that it is completely inappropriate for the Examiner to rely on Applicant's disclosure for motivation to combine prior art references. The motivation to combine references must be found in the prior art or within the level of ordinary skill in the art. The Examiner cannot use Applicant's own disclosure as a guide for piecing together various elements in the art to arrive at Applicant's claimed invention. *In re Gorman*, 18 U.S.P.Q.2d 1885, 1888, 933 F.2d 982 (Fed. Cir. 1991). "It is impermissible, however,

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simply to engage in a hindsight reconstruction of the claimed invention, using the applicant's structure as a template and selecting elements from references to fill the gaps."

In view of the lack of motivation to combine Elers and Bai, the Examiner has failed to make a *prima facie* case of obviousness and the present rejections should be withdrawn.

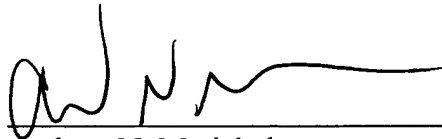
CONCLUSION

Applicant submits that in view of the arguments presented above, the present application is in condition for allowance and respectfully requests the same. If any issues remain, the Examiner is cordially invited to contact Applicant's representative at the number provided below in order to resolve such issues promptly.

Respectfully submitted,

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